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ABSTRACT

This report summarizes the results of research studies on instructional practices that significantly affect the cognitive, language, or mental abilities of students with disabilities. The investigation reviewed current research on instruction of students with moderate disabilities and sought to identify effective instructional practices. The steps were to define the term instructional practice, develop a rubric for evaluation of the research, identify the instructional practices used with students with moderate disabilities from the research literature, analyze and summarize the research articles, and validate findings using a task force of individuals with expertise in either instructional practices or working with students with disabilities. Based upon the research analysis rubric, 73 research articles were summarized. The following 17 of the 22 instructional practices were rated effective by category: (1) response prompting: auditory prompts, constant time delay, progressive time delay, simultaneous prompting, least prompts; (2) stimulus modification: behavior chaining, stimulus shaping, and stimulus fading; (3) naturalistic teaching: incidental teaching, observational learning, Mand model; (4) organization of instruction: peer-mediated instruction, group instruction, and direct instruction; and (5) learning processes: cognitive process strategy, multiple exemplars, and discrimination learning theory. An appendix explains the various instructional strategies. (CR)

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Translating Research Into Practice for Instruction of Students with Moderate Disabilities

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This paper was developed through the Accommodations and Modifications for Students with Disabilities Project, Center for Performance Technology, Florida State University and funded by the State of Florida, Department of Education, Division of Public Schools and Community Education, Bureau of Instructional Support and Community Services, through federal assistance under the Individuals with Disabilities Education Act (IDEA), Part B.

Translating Research Into Practice for Instruction of Students with Moderate Disabilities

Purpose

In order to meet accountability demands and improve student learning, it is imperative that the findings from research be translated into classroom practice. All segments of the student population, including those with moderate disabilities, must receive instruction that is grounded in research-based programs and instructional strategies. Florida has been a leader in focusing on accountability with a long-term commitment to ensuring support for the use of research-based practices. Instruction for students with disabilities has always been considered a part of the commitment. In support of that belief, the Florida Department of Education funded an activity to investigate research-based instructional practices that can improve the education of students with moderate disabilities. Information from the investigation will be used to direct policy decisions and devise support to ensure that teachers incorporate the effective strategies into their instruction. In keeping with the conference theme of shared responsibility for improving education, this paper focuses on the translation of research into useable formats for teachers, specifically those who teach students with moderate disabilities.

Rationale

A knowledge base of effective practices allows professionals in any field to have a wider range of choices and to make better informed decisions about how to meet the individual needs of their clients. In education, research findings provide information about how to conduct instruction with confidence that what the teacher does will improve student learning. The goal of identifying effective practices is to give teachers information that allows them to match the practices to their instructional situations and the students they are teaching in order to produce specific student outcomes. In short, research can provide the guidance to design instruction that will lead us to greater accountability and improved student learning.

Numerous types of research procedures are available for investigators to choose from, depending on the type of information needed. These procedures range from descriptive studies designed to test a theory or report findings for a specific case to empirical studies with comparison groups and large-scale replications of specific techniques or interventions. In order to consolidate information regarding a particular instructional practice it is helpful to have a method for sorting through the various research procedures used. This method must include a systematic process for analyzing the strength of the research studies in order to best utilize the results and make judgments about the issue in question.

Regardless of its methodology, any well-designed study should contribute information that can inform the professional knowledge base. When a theory or practice has been tested and reliable results have been documented through research using comparison groups, and when the study has been replicated and validated through additional testing

in an applied or clinical setting, sufficient evidence begins to accumulate to allow the knowledge gained to enter into the professional practice.

The key element to consider when determining if the accumulated research on a particular practice should become standard practice is whether or not the body of consolidated research on the topic in question is valid. Carnine (1999) suggests a four-point continuum for evidence of research usefulness that can be used to evaluate information about research findings. The first point on the continuum identifies strong evidence when "three out of four well-designed studies with a control group show significant effects…few significant, negative effects" and the results are "large enough to be valued by teachers and parents." The next point on the continuum identifies a promising practice evidenced by one out of three studies with a control group showing positive results and other studies showing no difference. The third point on the continuum represents marginal evidence of results in studies that are well-designed but lack control groups or are descriptive studies finding positive effects. The final point on the continuum would be the unacceptable level when there have been no well-designed studies including control groups, or descriptive studies report primarily negative results, or data on outcomes are not available.

Once sufficient research has been conducted and a convergence of findings is emerging, the issues of access to and implementation of the knowledge become critical. The knowledge must be accessible to practitioners when they need it and it must be in a useable format (Carnine, 1999). Warby, Greene, Higgins & Lovitt (1999) suggest a universal format for presenting research information to practitioners that provides a breakdown of the research information and outlines clear procedures for using the research-based intervention. The format provides for descriptive information including citations, abstract, and a general description on the study. A description of the procedures and interpretation of the findings summarizes the activity yet includes enough information to inform the reader of the steps necessary to implement the practice. The format allows practitioners to record ways to adapt use of the practice within the classroom.

In addition to having the information accessible in a useful layout, it is also important to organize the findings in a format that allows practitioners to know what is required to implement the intervention, including training and support, and how it can be integrated into the instructional setting. Integrating use of new instructional practices and sustaining their use over time is a major implementation issue. Vaughn, Klingner, & Hughes (2000) identify several factors that contribute to low levels of implementation, including a high "cost" of changing to a research-based method that may have limited benefit, the time involved in implementing new practices, and classroom realities that impede successful implementation.

Fuchs & Fuchs (1998) have identified four misconceptions on the part of both researchers and practitioners about the availability and use of effective practices. They are:

- "empirical research in education is a failure,"
- "researchers do not respect teachers,"

- "validated practices cannot be both standardized and situated," and
- "a puny supply of effective practices causes the gap between research and practice."

It is important to address each of these misconceptions and clear the way for providing accurate information to both researchers and teachers. Although it is true that empirical research in education can be difficult to conduct, it is inaccurate to consider it a failure. Research that provides empirical evidence requires a systematic, comprehensive methodology and is often expensive. However, this type of research does exist and provides solid information for educational decision-making.

The misconception that researchers do not respect teachers is countered with an increasing number of partnerships between researchers and teachers to investigate potential instructional practices (Fuchs, Fuchs, Al-Otaiba, Thompson, Yen, McMaster, Svenson, & Yang, 2001; Vaughn, Klingner, & Hughes, 2000). While the roles of the researcher and teacher may vary throughout the research process, both partners are vital to answering the research questions (Fuchs & Fuchs, 1998).

It does appear that standardizing procedures can be in conflict with adapting procedures to individual instructional situations. However, there is evidence that one does not necessarily preclude the other. Fuchs & Fuchs (1998) provide several examples where standard procedures for a practice are established and individual teacher implementation is incorporated into validation of the practice under study. The importance of adjusting the practice to the teaching situation is even more critical with the student population investigated in this paper, due to the heterogeneity of learner characteristics in the population.

The research to practice gap may be based more in lack of information about and demand for use of research-based practices rather than a limited supply of practices to choose from. In fact, a wide range of validated instructional practices have been identified. But it is rare to find widespread dissemination of information about these validated practices to practitioners. The expectation that practices will be used increases once teachers, administrators, and the public are armed with knowledge about the impact of using a validated practice. One notable example is the recent work of the National Reading Panel (National Institute of Child Health and Human Development, 2000) that has been widely published and publicized to teachers, school administrators, policy makers, and the general public.

If we are to overcome the barriers to implementation outlined above, researchers and practitioners must cooperate to make the transition from information about the knowledge base to implementation of the knowledge base in the classroom (Fuchs & Fuchs, 1998). Fortunately there are a growing number of instances where the research findings are beginning to converge into a body of knowledge that can provide a starting place for integrating effective strategies into practice (Fuchs & Fuchs, 1998). In fact, a number of practices have been analyzed using a validation procedure similar to the one Carnine (1999) has proposed (National Institute of Child Health and Human

Development, 2000; Peterson, Caverly, Nicholson, Neal, & Cusenbary, 2000; Vaughn, Gersten, & Chard, 2000).

The advent of standards, reporting of student progress, and accountability systems that include consequences for student performance have increased the demand for the use of research-based practices (Fuchs & Fuchs, 1998). The synthesis of research in special education has primarily focused on students with mild disabilities who receive instruction in typical content areas (Vaughn, Gerstain, & Chard, 2000). However, the implications for accountability and demand for effective practices are not limited to one segment of the special education population. Expectations are that ALL students will perform and achieve high standards.

This paper summarizes the results of an initial investigation into the research studies targeted to instructional practices for students with disabilities that significantly impact their cognitive, language, or mental abilities. A research analysis rubric was used to determine the level of strength in the research findings. While much of the recent growth in the special education instructional knowledge base has been in the area of students with mild disabilities, the focus here was to begin the process of identifying effective practices for students with moderate disabilities. The results of this investigation can contribute to the identification of additional research that should be conducted and practices that focus on implementation into the classroom.

Methods

The purpose of this investigation was to review the current research on instruction of students with moderate disabilities and identify effective instructional practices. The steps were to define the term instructional practice, develop a rubric for evaluation of the research, establish a format for summarizing the research articles, identify the instructional practices used with students with moderate disabilities from the research literature, analyze and summarize the research articles, and validate findings using a task force of individuals with expertise in either instructional practices or working with students with disabilities.

Definitions of what constituted instructional practices were developed based on work conducted at the National Center to Improve the Tools of Educators (NCITE, n.d.). The terms and definitions are used as a basis for placing instructional practices into approximate categories and are not intended to be used in a rigid fashion. The categories and definitions of instructional practices are given below.

- A **Comprehensive Model** refers to systematic implementation of several programs, components, or practices in an entire school or setting. The systematic implementation includes the organization of a school (allocation of resources, personnel, scheduling), the processes and procedures in a school, and the training conducted in the instructional practice and use of information-based problem solving.

- A **Program** typically addresses a full curriculum area and may have several components and practices.

- A **Program Component** has a more narrow focus than an entire program. A program component may be one or more routines, procedures, or processes that can be applied in a number of programs, or a way of delivering or organizing instruction.

To guide the review of research, a rubric was developed to analyze the article to determine the strength of the information contained in the research articles. The components of the rubric were

- theoretical base of a study, including statements about expected student outcomes,
- nature of the evidence gathered in the study, including characteristics of the research design, sample size and description, type of measures used, intervention description and sustained gains,
- how the practice was implemented, including clear description of procedures, requirements to implement the practice at the study site, and length and degree of implementation,
- replication of the study, including the number and results of any replications of the intervention or study, and
- adequacy of the reported information, focusing on the specificity and completeness of the information that would allow replication of the intervention.

The rubric was developed based upon the principles outlined by Carnine (1999) and research analyses and procedures from the work of several national and state organizations, including the U.S. Department of Education Comprehensive School Reform Demonstration Program, U.S. Department of Education's Program Effectiveness Panel, National Center to Improve Tools in Education, Florida Department of Education Project CENTRAL, the Joint Committee on Standards for Educational Evaluation, and the Florida Department of Education School Improvement Resource Center.

A modification of Carnine's (1999) continuum was necessary after the initial review of the research. The characteristics considered marginal by Carnine were considered adequate for purposes of this study in order to allow for the lack of large scale, control group studies with the targeted group of students. This modification made it possible for information from well-designed single subject and small comparison group studies from the research to be included and to begin to consolidate information about the current state of the knowledge base for this population of students. Meta-analyses and research reviews were analyzed using the rubric with the additional feature of an examination of the methodology for structuring the analysis or review.

A format for summaries of the research studies was developed with components similar to those suggested by Warby, Greene, Higgins, & Lovitt (1999). The components used included (1) the title and citation for each research article, (2) a brief notation of the intervention or practice utilized in the study, including the type of practice (comprehensive, program, or program component), (3) a description of the sample

population, (4) the methods used, including study procedures, intervention descriptions, and measure used, (5) the study results, and (6) a brief summary of the research findings and conclusion.

The next step in the investigation was the identification of instructional practices reported in research articles found through (1) searches of three education reference databases (ERIC, PsycInfo, and Educational Abstracts), (2) review of the table of contents for refereed journals of education research and disability organizations such as American Association on Mental Retardation, Council for Exceptional Children – Mental Retardation Division, and the Association for Severely Handicapped, and (3) input from district special education program personnel throughout the state. Articles were collected that reported a research study on instructional practices, as defined earlier, for students with moderate disabilities and that provided outcome data. Articles were not included in the investigation if they contained no or inadequate information in the major areas. Three doctoral level professionals collaborated to make this determination. Literature summaries, meta-analyses, and individual research articles were included if they reflected study characteristics similar to those found in the individual article reviews.

Following the rubric analysis, each article was analyzed and summarized by graduate assistants using the elements in the summary template. The written summaries and articles were reviewed by two experts to assure accurate reflection of the research information. A total of 73 articles were summarized. For organizational purposes, the articles were categorized into five groups sorted by similar practices. The categories were response prompting, stimulus modification, naturalistic teaching, organization of instruction, and learning processes. These articles yielded 22 instructional practices in the five categories. The number of articles within each practice category ranged from 10 - 16. The instructional practices sorted by category are listed in table 1. Descriptions of both the categories and the instructional practices are provided in appendix 1.

The next task was to identify effective practices for students with moderate disabilities as reported in the research literature. The investigation described in this paper was part of a task contracted by the Florida Department of Education to identify practices and to make recommendations about improving the use of the practices in Florida classrooms. To assist with completion of the task, a task force was convened to provide expert review of the initial investigation and confirmation of effective practices. The task force consisted of thirteen individuals who represented university programs and projects, district level program administrators, teachers, parents, and professional organizations. A concerted effort was made to assure membership that represented many interests in the state including preservice programs, the various regions of the state, different sizes school districts, specific projects, and professional associations.

To validate or reject the initial research review, the task force examined the summaries of the 73 research articles to identify major findings and key information about the setting and conditions of the research. Prior to beginning the examination, task force members were provided an orientation to the work that had been completed. The orientation included a review of the methods used to identify practices and research articles, a

discussion of the definitions of instructional practices, the basis for including articles in the activity, and the types of information in the article summaries.

Table 1

Instructional Practice Groupings by Category

Category	Instructional Practice
Response Prompting	• Least prompts • Constant time delay • Auditory prompting • Simultaneous prompting • Progressive time delay
Stimulus Modification	• Stimulus shaping (also known as task demonstration model) • Stimulus fading • Behavior chaining
Naturalistic Teaching	• Observational learning • Incidental teaching • Mand model • Naturalistic time delay
Organization of Instruction	• Community-based instruction • Computer-assisted instruction • Group instruction • Peer-mediated instruction • Direct instruction
Learning Processes	• Cognitive process strategy • Self-determination • Discrimination learning theory • Self-monitoring • Multiple exemplar

During the review of research summaries, task force members worked in small groups made up of a mix of members from various geographic regions and job assignments. In their small groups, the task force members were asked to do three things. They were first asked to read research summaries for a specific practice, referring to the original research articles for clarification as needed. Next, each small group was asked to identify major findings and key information from each separate research summary. The small group was then asked to consolidate the information from all the research studies for each instructional practice into a statement about the practice. This consolidated information was referred to as a "nugget statement." After completing the three tasks, each small group presented its nugget statement to the total group, explained its findings, answered questions, and discussed the information. The task force discussion served as an

opportunity to clarify and use individual expertise from group members to validate or revise the summaries.

Based upon the literature review and analysis, the task force members were asked to rate each practice as "effective," "not effective," "need more information," or "can't decide." The practice was considered "effective" if there were multiple studies utilizing the practice and showing positive results. The practice was labeled "not effective" if there were no or mixed positive results or if the results were not maintained over time. The label of "need more information" was assigned if there were known references that were not included in the summaries provided, there were too few articles to reach a conclusion, or there was a need for explanation or clarification about the information provided. The "can't decide" label was used when there were strong, but conflicting results in the studies. Any practice that did not have 100 % agreement among task force members as "effective" or "not effective" was moved to the "need more information" or "can't decide" rating. For items rated "need more information" or "can't decide," additional information specific to the concerns raised by task force members was gathered. Task force members reviewed the additional information and decided if the new information was sufficient to change the item's rating.

Results

Based upon the research analysis rubric, 73 research articles were summarized, including individual studies, meta-analyses, and literature summaries. A general analysis of the research articles revealed that 60% (44 of 73) of the research was conducted with five or fewer subjects in each study. The majority (69%; 51 of 73) of the studies utilized a 1:1 adult to subject ratio. Research was conducted across a variety of educational and clinical settings. There were few articles within a category that reported practices applied to exact or similar skills (i.e., doing laundry, selecting items from a menu, etc.).

Based upon the task force review, 17 of the 22 practices were rated "effective." Members judged that multiple studies had positive outcomes for the practice with the caveat that some of the practices had been found to be effective only with specific tasks or skills. The practices that received an "effective" rating are organized by practice categories and are listed in table 2.

Three practices were identified as "need more information" before a decision about their effectiveness could be reached. These practices were self-monitoring, naturalistic time delay, and computer-assisted instruction. The information needed for these three practices ranged from additional studies with students with moderate disabilities, information to address maintenance of skills or generalization, or additional details about the steps utilized in a particular practice. After additional review, the task force determined the new information was insufficient to rate either "effective" or "not effective" and kept the "need more information" rating.

Table 2

Practices Rated as Effective by Category

Category	Instructional Practice
Response Prompting	• Auditory prompts • Constant time delay • Progressive time delay • Simultaneous prompting • Least prompts
Stimulus Modification	• Behavior chaining • Stimulus shaping • Stimulus fading
Naturalistic Teaching	• Incidental teaching • Observational Learning • Mand model
Organization of Instruction	• Peer-mediated instruction • Group instruction • Direct instruction
Learning Processes	• Cognitive process strategy • Multiple exemplars • Discrimination learning theory

The task force recommended that two items were removed from the original list of 22 practices. Community-based instruction (CBI) provides instruction in a natural environment. After additional investigation and analysis, the task force determined that CBI is more focused on the instructional setting than a routine, procedure, or process that can be applied within a number of programs. CBI describes where a student is taught (the setting). The decision was made to drop CBI from consideration. There was also discussion about whether self-determination was an instructional strategy or a content area. The task force concluded that self-determination was a content area that could be taught using a variety of instructional practices. Based upon this discussion and the information reviewed, a decision was made to remove it from the list also. However, while neither item clearly met the definition of an instructional practice, both appear to have value for students with moderate disabilities.

Discussion

The initial investigation of research studies related to students with moderate disabilities identified instructional practices that showed positive results. Several rating systems for making judgments about the depth and preponderance of knowledge are available. When these rating systems are applied to the research conducted with the population of concern, few studies were located that would indicate strong evidence to support instructional practices used with the students. There are, however, some well-designed studies utilizing small samples of students and methodologies consistent with sample size that

can inform the knowledge base for teaching students with moderate disabilities. This was the research that was emphasized in this investigation.

The lack of multiple large-scale studies may be due to two issues. First, the measurement of meaningful achievement levels for the population of students is complicated by several factors. There is wide variation in the learning speed, ability, and general knowledge of the students due to the nature of the student's disabilities. This makes comparisons among groups difficult. Because of these variations, the student learning goals often focus on mastery of discrete tasks. Therefore, many of the studies focus on use of an instructional practice to learn these tasks and leave the question of generalization to other types of tasks. Second, it is difficult to gain support and develop a system to implement large-scale studies (Fuchs & Fuchs, 1998). When the study focuses on a small number of students with complicated learning characteristics, it is difficult to design and gain support for a large-scale proposal.

The task force that reviewed and rated the article summaries echoed the issue of confidence in research findings. A particular consideration is the small number of students included in the studies, which makes it difficult to generalize the findings. The limited number of studies and lack of replication for some of the instructional practices also undermined the level of confidence. However, the task force was not able to quantify the number or size of studies needed in order to reach a solid conclusion regarding effectiveness of the practice.

The task force also raised a second question of how the practices could be applied in a classroom, rather than a clinical setting. Of specific concern was the lack of information about the practical use and application of the instructional practices in a typical classroom setting. In addition, the task force felt that more information was needed about whether the steps in a practice could be modified and still reach the same level of results found in the study.

The research analysis and the task force review did not reveal strong evidence in favor of any practice. The findings did indicate that there were multiple small studies that indicated positive results. These studies show there is basic knowledge about the procedures to implement the practices, but that stronger information is needed to increase confidence in use of the practices. Based upon the information available, the task force was willing to denote some of the instructional practices as effective with the caveat that care should be taken in translation of the practice to the classroom and the type of skill being taught.

Educational Implications

This investigation makes a strong case for increasing support and specifying standards for research to identify effective instructional practices for students with moderate disabilities. The research agenda would be strengthened by expansion of current rubrics to make decisions about research conducted with smaller populations of students with

disabilities. It would also be bolstered by an emphasis on application in instructional settings that will provide clear information about realistic use of the practices by teachers.

A clear link between research design and classroom application could be a major tool to increase the use of research-based knowledge in classrooms. Designing studies that address both the procedures of an instructional practice and the situations in which it can be applied in a classroom can provide teachers with information that promotes quality implementation. Precise information about the amount of teacher preparation and support needed to implement a practice can increase the likelihood of a staff development program that will lead to appropriate use of the research information. Clearly there is a need to continue to research new and promising instructional practices to be used with students with moderate disabilities that focus on applying the practices in an instructional setting.

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Appendix

Descriptions of Instructional Practices and Categories

- **Auditory prompting** – auditory input given to shape a person's behavior, usually used in coordination with other stimuli and cues to elicit a target response
- **Behavior chaining** – linking of component behaviors into a more complex, composite behavior; uses a task analysis to reinforce successive elements of a behavior chain
- **Cognitive process strategy** – a technique for teaching students to evaluate and set goals for their own behavior
- **Community-based instruction** – a model that provides instruction in the natural environment with the actual stimuli to which students will need to respond, thereby mitigating problems associated with the transfer of stimulus control from simulated conditions
- **Computer-assisted instruction** – type of instruction that is aided by computer technology; computers may present curriculum, request student responses, and provide feedback and reinforcement
- **Constant time delay** – a specified time interval is inserted between a teacher's question and a verbal model of the desired response
- **Direct instruction** – a model of teaching that includes explicit teaching of problem-solving strategies, small group instruction, use of correction procedures, and cumulative review, requiring mastery at each step of instruction
- **Discrimination learning theory** – a model of teaching that includes a match-to-sample format, mastery at each step of instruction, errorless learning, sequencing, and feedback
- **Group instruction** – an instructional arrangement that may involve lectures, media presentations, discussions, and other methods designed to present information to a number of participants at a time
- **Incidental teaching** – teaching toward specific, predetermined objectives by capitalizing on natural, unplanned opportunities

- **Learning processes** – cognitive or meta-cognitive procedures that are explicitly taught and modeled with the goal of independent use of the process by students
- **Least prompts** – a hierarchy of response prompts in which the teacher gives progressively more assistance until the student provides a correct response
- **Mand model** – a naturalistic language approach where target vocabulary is first requested by the teacher (e.g., "Tell me what you want."); if the student does not respond or responds incorrectly the teacher provides a model (e.g., "You want crackers.")
- **Multiple exemplars** – use of numerous examples of the concept/skill to be taught
- **Naturalistic teaching** – spontaneous, individualized instruction that occurs when a child and an adult interact in a naturally occurring activity that provides the child with opportunities to use more complex language
- **Naturalistic time delay** – a procedure that provides natural cues (i.e., expectant eye gaze) followed by an appropriate amount of time (based on the situation) between a teacher's question and a model of the targeted response
- **Observational learning** – type of learning that is based on acquiring new behavior by observing the responding of another
- **Organization of instruction** – the routine, procedure, or process used to present or arrange for presentation of information (i.e., student grouping, scripted lesson presentation)
- **Peer-mediated instruction** – a technique where peers take on an instructional role with classmates typically in dyads or small group situations
- **Progressive time delay** – a specified time interval is inserted between a teacher's question and a verbal model of the desired response; over sessions this time interval is increased
- **Response prompts** – additions to a discriminative stimulus or natural cue to help the student make the target response (i.e., gestures, verbal directions, a model, physical guidance)
- **Self-determination** – the skills and knowledge that enable a person to engage in goal-directed, self-regulated behavior
- **Self-monitoring** – a process that requires the individual to observe whether a behavior of interest has occurred and to record its occurrence or non-occurrence in some manner
- **Simultaneous prompting** – procedure wherein the teacher asks a question (i.e., "What sign?") and immediately provides a verbal model (i.e., "McDonald's") that the student is expected to repeat; verbal models are always provided; probe sessions are conducted before training sessions
- **Stimulus fading** – procedure that gradually reduces the stimulus over time as the target response becomes more consistent

- **Stimulus modification** – procedure in which materials or other stimuli are changed in order to elicit a correct response
- **Stimulus shaping** – procedure where materials are gradually changed over time so that discrimination is at first easy and gradually becomes more difficult (see task demonstration model)

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